

REMARKS

In the Official Action, the Drawings, specifically Figure 1, are objected to by the Examiner. Further, the specification has been objected to. Additionally, claims 2-3 and 5 have been objected to. Finally, claims 1-5 have been rejected under 35 U.S.C. §103(a).

The claims have been amended as outlined in Appendices A ("mark-up" copy) and B ("clean" copy) to overcome the objections and rejections raised by the Examiner.

Pages 1 through 15 of the specification have been amended as outlined in Appendices C and D to overcome the objections raised by the Examiner. Sheet 1 of the Drawings has been amended to overcome the objections raised by the Examiner.

The amendments to the specification, drawings and claims do not introduce new matter within the meaning of 35 U.S.C. §132. Accordingly, the Examiner is respectfully requested to enter the above amendments.

1. Objection to the Drawings

In Response to the Examiner's objection of the Drawings, Applicants submit herewith a letter to the Draftsperson and a proposed correction, marked in red, to the drawing of Figure 1.

2. Objection to the Specification

In response to the Examiner's objection to the specification, Applicants submit herewith an amended specification as indicated in Appendices C ("marked-up" copy) and D ("clean" copy).

3. Objection to claims 2-3 and 5

In response to the Examiner's objection of claims 2-3 and 5, Applicant's submit herewith claim amendments as indicated in Appendices A ("marked-up" copy) and B ("clean" copy).

4. Rejection of Claims 1 and 4-5 under 35 U.S.C. §103(a)

Claims 1 and 4-5 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,375,516 to Hasegawa in view of U.S. Patent No. 5,911,527 to Aruga et al. In particular, the Official Action states the following:

Hasegawa shows a stencil printing machine comprising a plurality of printing drums and a control section controlling a mono-color or multicolor stencil printing process such that, unused printing drums are kept stationary. See Column 11, lines 22-30.

Hasegawa does not teach that even if the unused printing drum is in an error state, the stencil printing process is performed using other printing drums.

Aruga et al. teaches a printing machine with a plurality of printing mechanisms, and a control section controlling such that, when one printing mechanism is in an error state, the printing is carried out using the other printing mechanism.

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the control logic of Aruga et al. to the control section of Hasegawa, so that printing could be carried out more efficiently when an unused printing drum is in an error state.

Applicants respectfully traverse the rejection of claims 1 and 4-5. The references of record do not teach or suggest applicant's inventive subject matter as a whole as recited in the claims. The Examiner has failed to establish a *prima facie* case of obviousness against the presently rejected claims.

To establish a *prima facie* case of obviousness, the PTO must satisfy three requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Lastly, the prior art references must teach or suggest all the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

The presently claimed invention relates to a stencil printing machine which comprises a plurality of printing drums adapted to

print on a same print paper and a control section controlling a stencil printing process so that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums.

In contrast, the Hasegawa reference teaches a stencil printing device of a multi printing drum type, where unused printing drum rollers are kept stationary. As conceded by the Examiner, Hasegawa does not teach that even if the unused printing drum is in an error state, the stencil printing process is performed using other printing drums. Aruga et al. does not remedy this deficiency.

Applicant respectfully submits that the Aruga et al. reference is inappropriate as a prior art reference to the presently claimed invention because the reference is drawn from non-analogous art. Consequently, the applicant respectfully submits that the Examiner's reliance thereon is misplaced.

The law is well settled that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. ACS Hospital Systems, Inc. v. Montefiore Hospital et al., 732, F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). Applicant respectfully submits that there is no suggestion or teaching supporting the combination of the Hasegawa reference ('516 patent) with the Aruga et al. reference ('527 patent). There is no

motivation to make that combination because the references are not in analogous arts and the Examiner has not fulfilled the burden of supporting the contention that the arts are analogous. It is Applicant's position that the Aruga et al. reference is not from the same field of endeavor as the presently claimed invention and that the Aruga et al. reference is not reasonably pertinent to the particular problem with which the inventor was involved.

Thus, Applicant submits that the Examiner's combination of the Hasegawa and the Aruga et al. references is erroneous. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejections based on this combination.

A. The Aruga et al. patent is not from the same field of endeavor

The Aruga et al. reference is directed to a hybrid printing device that performs printing processing based on data received from a host device and comprises first and second printing mechanisms each equipped with independent printer heads that perform perform printing on mutually differing types of recording mediums. The Aruga et al. reference does not teach a stencil printing device that contains a plurality of printing drums.

It is well established that the question of whether a reference in the prior art is analogous is a fact question. Panduit Corp. v. Dennison Manufacturing Co., 810 F.2d 1561, 1568, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987), cert. denied, 481 U.S. 1052

(1987). This determination is made with reference to two basic criteria: whether the art is from the same field of endeavor, regardless of the problem addressed; and if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986); In re Clay, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992).

It is respectfully submitted that In re Oetiker, 24 USPQ2d 1443 (Fed Cir. 1992), exemplifies the proper application of the foregoing test in the mechanical arts. In In re Oetiker, the applicant claimed an improvement in a hose clamp which differed from the prior art in the presence of a pre-assembly hook which maintained the pre-assembly condition of the clamp and disengaged automatically when the clamp was tightened. A rejection under 35 U.S.C. § 103 was based on a reference which disclosed a hook and eye fastener for use in garments, based on purported reasoning that all hooking problems are analogous. In reversing the rejection, the Court held that the reference was not within the field of the applicant's endeavor, and was not reasonably pertinent to the particular problem with which the inventor was concerned because ***it had not been shown that a person of ordinary skill, seeking to solve a problem of fastening a hose clamp, would reasonably be***

expected or motivated to look to fasteners for garments. The

Oetiker Court further stated that:

...it is necessary to consider the reality of the circumstances [citations omitted] -- in other words, common sense -- in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor.... **The combination of elements from non-analogous sources, in a manner that reconstructs the applicant's invention only with the benefit of hindsight, is insufficient to present a prima facie case of obviousness. There must be some reason, suggestion or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination. That knowledge can not come from the applicant's invention itself.**

Id. at 1446. [Emphasis added].

As stated above, the presently claimed invention involves the art of stencil printing machine comprising printing drums adapted to print on a same print paper and a control section controlling a stencil printing process so that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums. (Emphasis added)

In stark contrast, however, the Aruga et al. reference is directed to an entirely different type of printing device that performs the printing process by a completely different methodology. Aruga et al. teach a hybrid printing device that performs printing processing based on data received from a host device and comprises first and second printing mechanisms each equipped with independent printer heads that perform printing on mutually differing types of recording mediums. The Aruga et al. reference does not teach a stencil printing device that contains a plurality of printing drums. In fact, the Aruga et al. reference does not even contain the terms "stencil printing" or "printing drum".

Accordingly, it is respectfully submitted that the Aruga et al. reference fails the first criteria as it is not from the same field of endeavor as the presently claimed invention.

B. The Aruga et al. reference is not reasonably pertinent to the particular problem with which the inventor was involved.

It is further submitted that the Aruga et al. reference fails the second criteria since it is not reasonably pertinent to the particular problem with which the inventor of the presently claimed invention was involved.

As stated in the specification of the instant application, the particular problem with which the inventor was involved related to

providing "a stencil printing machine and a control method thereof capable of improving the user-handling of the stencil printing machine and the stencil printing process." See page 2. [emphasis added]. There is a long felt need in the stencil printing process due to the problems well known with the conventional technique as outlined on page 2 of the specification. The drawback is that "the entire printing process, specifically, a mono-color printing process can not be performed when one of [the] printing drums is not mounted in the machine, or no ink cartridge is mounted, or the ink cartridge is empty, or no discharged stencil sheet box is mounted, or the discharged stencil sheet box is filled in one of the printing drums. In those cases, it is hard for the user to handle the stencil printing machine...specifically in order to perform a mono-color printing." *Id.*

It is respectfully submitted that the art of hybrid printing devices that perform printing processing based on data received from a host device and comprise first and second printing mechanisms that perform printing on mutually differing types of recording mediums is not reasonably pertinent to providing an improved stencil printing machine and a control method thereof, wherein a control section controlling a stencil printing process so that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums.

As in In re Oetiker, the Aruga et al. reference is not within the field of Applicant's endeavor, nor is it reasonably pertinent to the particular problem with which Applicant was concerned, namely providing an improved stencil printing machine and control method thereof. Furthermore, like in In re Oetiker, there is no showing that a person of ordinary skill, seeking to solve this problem would reasonably be expected or motivated to look to devices used for hybrid printing comprising first and second printing mechanisms that perform printing on mutually differing types of recording mediums.

Accordingly, it is submitted that the Fine reference fails the second criteria as is not reasonably pertinent to the particular problem with which the inventor was involved.

C. Even if combined, the Hasegawa and Aruga et al. references would not teach the presently claimed invention

The Examiner states in the Official Action the following:

Aruga et al. teaches a printing machine with a plurality of printing mechanisms, and a control section controlling such that, when one printing mechanism is in an error state, the printing is carried out using the other printing mechanism.

As stated before, the presently claimed invention relates to a stencil printing machine which comprises a plurality of printing drums adapted to print on a same print paper and a control section controlling a stencil printing process so that even if the printing

drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums.

In contrast, the Hasegawa reference teaches a stencil printing device of a multi printing drum type, where unused printing drum rollers are kept stationary. As conceded by the Examiner, Hasegawa does not teach that even if the unused printing drum is in an error state, the stencil printing process is performed using other printing drums. Aruga et al. does not remedy this deficiency.

Aruga et al. teaches a hybrid printing device that performs printing processing based on data received from a host device and comprises first and second printing mechanisms each equipped with independent printer heads that perform printing on mutually differing types of recording mediums.

Aruga et al. is limited to "mutually differing types of recording mediums", while the presently claimed invention is directed to a machine that prints on the same recording medium, namely a "same print paper". Thus, the Aruga et al. reference teaches away from the presently claimed invention.

Accordingly, applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 1 and 4-5.

5. Rejection of claims 2-3 under 35 U.S.C. §103(a)

Claims 2-3 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hasegawa in view of Aruga et al. as applied to

claims 1 and 4-5 and further in view of U.S. Patent No. 6,095,040 to Ashikagaya et al., U.S. Patent No. 5,713,274 to Kawai et al. and U.S. Patent No. 5,537,920 to Hasegawa et al.

Applicants respectfully traverse the rejection of claims 2-3. Because applicants have successfully distinguished the presently claimed invention over the Hasegawa and Aruga et al. references above, thereby placing claims 1 and 4-5 in condition for allowance, and because claims 2 and 3 depend from claim 1, applicants have therefore also successfully placed claims 2 and 3 in condition for allowance.

Accordingly, applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 2-3.

CONCLUSION

Based upon the above remarks, the presently claimed subject matter is believed to be novel and patentably distinguishable over the prior art of record. The Examiner is therefore respectfully requested to reconsider and withdraw the rejections of pending claims 1-5. Favorable action with an early allowance of the claims pending in this application is earnestly solicited.

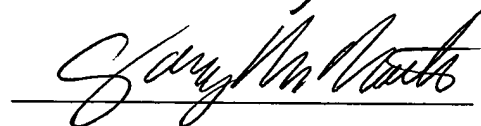
The Examiner is welcomed to telephone the undersigned attorney if she has any questions or comments.

Respectfully submitted,

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BOX PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Inventor: Yoshikazu HARA

Serial No. 09/920,651

Examiner: CULLER, Jill E.

Filed: August 3, 2001

Art Unit: 2854

Title: **STENCIL PRINTING MACHINE AND CONTROL METHOD THEREOF**

Appendix A

Please amend claims 1-5 according to the following "marked up" copy of the claims.

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1. (Amended) A stencil printing machine comprising:

a plurality of printing drums adapated to print on a same print paper;

a control section controlling a stencil printing process so that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums.

2. (Amended) The stencil printing machine according to claim 1, further [comprises] comprising:

a printing drum absence detection section comprising a plurality of first detectors [provided to a], one of said first detectors corresponding to each printing drum for detecting whether

or not each of the printing drums is mounted in the stencil printing machine;

a discharged stencil sheet box absence detection section comprising a plurality of second detectors [provided to a], one of said second detectors corresponding to each printing drum for detecting whether or not the discharged stencil sheet box is mounted in the corresponding printing drum; and

a discharged stencil sheet box full detection section comprising a plurality of third detectors [provided to a], one of said third detectors corresponding to each discharged stencil sheet box for detecting whether or not the discharged stencil sheet box is filled with used stencil sheets,

wherein each printing drum further comprises:

an ink container detection section detecting whether or not the ink container is mounted in the corresponding printing drum; and

an ink sensor section detecting whether or not an ink is filled in the corresponding ink container in the printing drum, wherein the control section controls the stencil printing process based on detection results of the above detection sections.

3. (Amended) The stencil printing machine according to claim 1, further [comprises] comprising an operation panel displaying error information and through which a user selects one or more the

printing drums to be used in the stencil printing process and instructs to initiate the stencil printing process,

wherein the operation panel comprises at least one of the display sections to inform following error states for each printing drum to the user:

no printing drum is mounted;

no ink container is mounted;

ink container is empty;

no discharged stencil sheet box is mounted; and

discharged stencil sheet box is filled with discharged stencil sheets.

4. (Amended) A control method of a stencil printing machine having a plurality of printing drums adapated to print on a same print paper, comprising a control step that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums.

5. (Amended) A control method of a stencil printing machine having at least two printing drums adapated to print on a same print paper executing a mono-color and multi-color printing process, comprising:

a control step that even if the printing drum that is not used

in the current stencil printing process in the mono-color printing process is in an error state, the mono-color printing process is performed by using other printing drums.

BOX PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Inventor: Yoshikazu HARA

Serial No. 09/920,651

Examiner: CULLER, Jill E.

Filed: August 3, 2001

Art Unit: 2854

Title: **STENCIL PRINTING MACHINE AND CONTROL METHOD THEREOF**

Appendix B

Please amend claims 1-5 according to the following "clean" copy of the claims. ✓

1. A stencil printing machine comprising:

a plurality of printing drums adapted to print on a same print paper;

a control section controlling a stencil printing process so that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums.

2. The stencil printing machine according to claim 1, further comprising:

a printing drum absence detection section comprising a plurality of first detectors, one of said first detectors corresponding to each printing drum for detecting whether or not each of the printing drums is mounted in the stencil printing

machine;

a discharged stencil sheet box absence detection section comprising a plurality of second detectors, one of said second detectors corresponding to each printing drum for detecting whether or not the discharged stencil sheet box is mounted in the corresponding printing drum; and

a discharged stencil sheet box full detection section comprising a plurality of third detectors, one of said third detectors corresponding to each discharged stencil sheet box for detecting whether or not the discharged stencil sheet box is filled with used stencil sheets,

wherein each printing drum further comprises:

an ink container detection section detecting whether or not the ink container is mounted in the corresponding printing drum; and

an ink sensor section detecting whether or not an ink is filled in the corresponding ink container in the printing drum, wherein the control section controls the stencil printing process based on detection results of the above detection sections.

3. The stencil printing machine according to claim 1, further comprising an operation panel displaying error information and through which a user selects one or more the printing drums to be used in the stencil printing process and instructs to initiate the

stencil printing process,

wherein the operation panel comprises at least one of the display sections to inform following error states for each printing drum to the user:

no printing drum is mounted;

no ink container is mounted;

ink container is empty;

no discharged stencil sheet box is mounted; and

discharged stencil sheet box is filled with discharged stencil sheets.

4. A control method of a stencil printing machine having a plurality of printing drums adapted to print on a same print paper, comprising a control step that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums.

5. A control method of a stencil printing machine having at least two printing drums adapted to print on a same print paper executing a mono-color and multi-color printing process, comprising:

a control step that even if the printing drum that is not used in the current stencil printing process in the mono-color printing

A1
(concluded)

process is in an error state, the mono-color printing process is performed by using other printing drums.

BOX PATENT
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Inventor: Yoshikazu HARA

Serial No. 09/920,651

Examiner: CULLER, Jill E.

Filed: August 3, 2001

Art Unit: 2854

Title: **STENCIL PRINTING MACHINE AND CONTROL METHOD THEREOF**

Appendix C

✓ Please amend the specification as outlined in the following
"marked-up" copy of the specification:

TITLE OF THE INVENTION

STENCIL PRINTING MACHINE AND CONTROL METHOD THEREOF

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims benefit of priority under 35 USC
§119 to Japanese Patent Application No. P2000-238948, filed on
Aug. 7, 2000, the entire contents of which are incorporated
herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a stencil printing machine and a control method thereof having a plurality of printing drums capable of performing multi-color printing.

[0004] 2. Description of the Related Art

[0005] In general, a stencil printing machine having plural printing [drum] drums capable of performing mono-color and multi-color printing comprises a first printing drum 111a, a second printing drum 111b, and a pressure drum 112 which are arranged rotatably, as shown in FIG. 1. Each of the first and second printing drums 111a and 111b are placed closely at the outer peripheral surface of the pressure drum 112 separated to each other in approximately a 90 degree angle around the center of the pressure drum 112.

[0006] In the initiation of the stencil printing process, firstly, stencil sheet clamp sections of both the first and second printing drums 111a and 111b clamp corresponding stencil sheets having perforations made based on the first and second color printing data so that they are rolled on the outer peripheral surface of the

corresponding printing drums. Following this process, a print paper is fed between the first printing drum 111a and the pressure drum 112 from the paper feed section 113 while the first and second printing drums 111a and 111b rotate around the arrow A in synchronization of the rotation of the pressure drum 112 around the arrow B.

[0007] Thereby, a print paper clamp section in the pressure drum 112 clamps the print paper which is fed and whereby the paper is further fed between the first printing drum 111a and the pressure drum 112 through the outer peripheral surface of the pressure drum 112. At this time, a first color ink is transferred onto the print paper through perforations made in the stencil sheet.

[0008] Next, the print paper from the first printing drum 111a is fed between the second printing drum 111b and the pressure drum 112. Similar to the first color printing process described above, the second color ink is transferred to the print paper through perforations made in the stencil sheet rolled on the second printing drum 111b. A paper delivery section 114 then delivers to a predetermined position the print paper on which a desired printing image data [have] has been printed. Finally, the stencil sheets rolled on the outer peripheral surface of the printing drums 111a and 111b are disposed into discharged stencil sheet boxes 115a

and 115b. Thereby, a series of the stencil printing process is completed.

[0009] By the way, the stencil printing machine of the configuration described above has a drawback in which the entire printing process, specifically, a mono-color printing process can not be performed when one of printing drums is not mounted in the machine, or no ink cartridge is mounted, or the ink cartridge is empty, or no discharged stencil sheet box is mounted, or the discharged stencil sheet box is filled in one of the printing drums. In those cases, it is hard for the user to handle the stencil printing machine having the above configuration, specifically, in order to perform a mono-color printing.

SUMMARY OF THE INVENTION

[0010] Accordingly, an object of the present invention is, with due consideration to the drawbacks of the conventional technique, to provide a stencil printing machine and a control method thereof capable of improving the user-handling of the stencil printing machine and the stencil printing process.

[0011] In accordance with an embodiment of the present invention, a stencil printing machine comprises a plurality of printing drums

and a control section controlling a stencil printing process so that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums. By this configuration of the stencil printing machine, it is possible to perform the stencil printing process using the printing drum which the user selects in the process without causing any trouble even if one printing drum which is not used in the process is in the error state.

[0012] Furthermore, in accordance with another embodiment of the present invention, a control method of a stencil printing machine having a plurality of printing drums comprises a control step of controlling a stencil printing process. In the control step, even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums. By this control method, it is possible to perform the stencil printing process using the printing drum which the user selects in the process without causing any trouble even if one printing drum which is not used in the process is in the error state.

[0013] Moreover, in accordance with another embodiment of the present invention, a control method of a stencil printing machine

having a plurality of printing drums capable of performing mono-color and multi-color printing processes comprises a control step in which a stencil printing process is so controlled that even if the printing drum which is not used is in an error state, the mono-color printing process is performed by using other printing drums. By this control method, even if the printing drum that is not used is in the error state, it is possible to perform the mono-color printing process by using other printing drums.

[0014] The stencil printing machine described above comprises a printing drum absence detection section comprising detectors provided to a corresponding printing drum detecting whether or not each of the printing drums is mounted in the stencil printing machine, a discharged stencil sheet box absence detection section comprising detectors provided to a corresponding printing drum detecting whether or not the discharged stencil sheet box is mounted in the corresponding printing drum, and a discharged stencil sheet box full detection section comprising detectors provided to a corresponding discharged stencil sheet box detecting whether or not the discharged stencil sheet box is filled with used stencil sheets. In addition, each printing drum further comprises an ink container detection section detecting whether or not the ink container is mounted in the corresponding printing drum, and an ink sensor section detecting whether or not an ink is filled in the

corresponding ink container in the printing drum. In the stencil printing machine, the control section controls the stencil printing process based on detection results of the above detection sections.

[0015] Furthermore, the stencil printing machine described above further comprises an operation panel displaying error information and through which a user selects one or more of the printing drums to be used in the stencil printing process and instructs to initiate the stencil printing process. In the stencil printing machine, the operation panel comprises at least one of the display sections to inform the following error states for each printing drum to the user: no printing drum is mounted; no ink container is mounted; ink container is empty; no discharged stencil sheet box is mounted; and a discharged stencil sheet box is filled with discharged stencil sheets.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] These and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings, in which:

[0017] FIG. 1 is a schematic diagram showing a basic configuration

of a stencil printing machine;

[0018] FIG. 2 is a block diagram showing a configuration of a stencil printing machine according to embodiments of the present invention;

[0019] FIG. 3 is a block diagram showing a configuration of an operation panel in the stencil printing machine shown in FIG. 2;

[0020] FIG. 4 is a flow chart of a stencil printing process according to an embodiment of the present invention;

[0021] FIG. 5 is a flow chart showing a printing drum switching process in the stencil printing process according to an embodiment of the present invention;

[0022] FIG. 6 is a flow chart showing a printing drum error detection process in the stencil printing process according to an embodiment of the present invention;

[0023] FIG. 7 is a flow chart showing a stencil making and printing process in the stencil printing process according to an embodiment of the present invention;

[0024] FIG. 8 is a flow chart showing another stencil making and printing process in the stencil printing process according to an embodiment of the present invention; and

[0025] FIG. 9 is a flow chart showing an error judgment process in the stencil printing process according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Other features of this invention will become apparent through the following description of preferred embodiments which are given for illustration of the invention and are not intended to be limiting thereof.

[0027] First Embodiment

[0028] Hereinafter, a description will be given [of] for the detailed explanation [for] of the configuration of the stencil printing machine and the control method thereof according to embodiments of the present invention with reference to FIG. 2 to FIG. 9.

[0029] <Configuration of Stencil Printing Machine>

[0030] Firstly, features of the configuration of the stencil printing machine 10 according to embodiments of the present invention will be explained with reference to FIG. 2.

[0031] The configuration of main basic components in the stencil printing machine 10 of the present invention shown in FIG. 2 is basically equal to that of the stencil printing machine shown in FIG. 1. That is, the first printing drum 1, the second printing drum 2, and the pressure drum 17 shown in FIG. 1 correspond to the first printing drum 1 (as a first drum), the second printing drum 2 (as a second drum), and the pressure drum 17 shown in FIG. 2, respectively. In addition, discharged stencil sheet boxes 31 and 32, a paper feed section 33, a paper delivery section 34 shown in FIG. 1 are omitted from FIG. 2.

[0032] The stencil printing machine 10 according to the embodiments of the present invention shown in FIG. 2 comprises the first printing drums 1, the second printing drum 2, a CPU (central processing unit as a control section) 11, printing drum absence detectors 12a and 12b, discharged stencil sheet box absence detectors 14a and 14b for the discharged stencil sheet boxes 31 and 32, discharged stencil sheet box full detectors 15a and 15b for the discharged stencil sheet boxes 31 and 32, a main motor 16, the

pressure drum 17, the operation panel 18, a ROM 19 for storing control programs for the operation of the CPU 11, and a RAM 20 for storing data such as operation variables. In particular, the CPU 11 controls the operation of each configuration components in the machine 10 according to the control programs stored in the ROM 19. The printing drum absence detectors 12a and 12b for the printing drums 1 and 2 detect whether or not each printing drum is mounted on the machine 10. The discharged stencil sheet box absence detectors 14a and 14b detect whether or not a discharge stencil sheet box is mounted on each corresponding printing drum. The discharged stencil sheet box full detectors 15a and 15b detect whether or not each discharged stencil sheet box is filled. The main motor 16 drives the printing drums 1 and 2 and the pressure drum 17. Through the operation panel 18, the user instructs the initiation of the operation of the printing drums 1 and 2 and the pressure drum 17 that will be used in the stencil making and printing process. The ROM 19 stores the control programs for the operation of the CPU 11.

[0033] Each printing drum comprises an ink container detector 13a (13a'), an ink sensor 13b (13b'), and an ink motor 13c (13c'). The ink container detector 13a (13a') detects whether or not the ink container is mounted on each corresponding printing drum. The ink sensor 13b (13b') detects the presence of the ink on a squeegee

roller of each printing drum (namely, the ink sensor detects whether or not the ink container is empty). The ink motor 13c (13c') supplies the ink to the squeegee roller the from the ink container.

[0034] As shown in FIG. 13, the operation panel 18 comprises an error display lamp section 18a, a first printing drum selection key 18b, a second printing drum selection key 18c, a first and second printing drums selection key 18d, a start key 18e, and a stop key 18f.

[0035] The error display lamp section 18a displays various states (specifically, error states) relating to each of the first and second printing drums 1 and 2. The user may select stencil making and printing process for the first printing drum 1 through the first printing drum selection key 18b in the operation panel 18. The user may also select the stencil making and printing process for the second printing drum 2 through the second printing drum selection key 18c. The user may also select the stencil making and printing process for the first and second printing drums 1 and 2 through the first and second printing drums selection key 18d. The user may instruct to start the stencil making and printing process through the start key 18e and to stop the stencil making and printing process through the stop key 18f.

[0036] The error display lamp section 18a comprises a plurality of error display lamps in order to inform the following error states to the user:

[0037] No first printing drum 1 is mounted (first printing drum absence lamp 21);

[0038] No second printing drum 2 is mounted (second printing drum absence lamp 22);

[0039] No first ink container is mounted (first ink container absence lamp 23);

[0040] No second ink container is mounted (second ink container absence lamp 24);

[0041] The first color ink in the first ink container is empty (first ink empty lamp 25);

[0042] The second color ink in the second ink container is empty (second ink empty lamp 26);

[0043] No first discharged stencil sheet box for the first printing

drum 1 is mounted (first discharged stencil sheet box absence lamp 27);

[0044] No second discharged stencil sheet box for the second printing drum 2 is mounted (second discharged stencil sheet box absence lamp 28);

[0045] The first discharged stencil sheet box for the first printing drum 1 is filled (first discharged stencil sheet box full lamp 29); and

[0046] The second discharged stencil sheet box for the second printing drum 2 is filled (second discharged stencil sheet box full lamp 30).

[0047] <Control Method of Stencil Printing Machine>

[0048] Next, a description will be given of the control method for the stencil printing machine 10 according to the embodiments of the present invention with reference to FIG. 4 to FIG. 9.

[0049] The stencil printing process of the stencil printing machine 10 is controlled based on following steps S301 to S308 shown in FIG. 4.

[0050] (1) When the user selects one or more the printing drums 1 and 2 (Step S301) through the first, the second, and the first and second printing drum selection keys 18b, 18c, and 18d on the operation panel 18, the CPU 11 executes the following sub-steps S401 to S410 shown in FIG. 5.

[0051] (1-1) It is judged whether or not the first printing drum selection key 18b is pushed (S401). When the key 18b is pushed, the entire error display lamp section 18a consisting of the plural lamps currently lighting up is switched off (S402). After the following first printing drum error detection and display process is executed (S403, described later), the operation flow goes forward to Step S303. On the other hand, when the key 18b is not pushed, the operation flow immediately goes to the process Step S404 (see FIG. 4 and FIG. 5).

[0052] (1-2) In the step S404, it is judged whether or not the second printing drum selection key 18c is pushed (S404).

[0053] When the key 18c is pushed, the entire error display lamp section 18a consisting of plural lamps currently lighting up is switched off (S405). After the following second printing drum error detection and display process is executed (S406, described later),

the operation flow goes forward to the process of Step S303.

[0054] On the contrary, when the key 18c is not pushed, the operation flow immediately goes to the process of S407 (see FIG. 4 and FIG. 5).

[0055] (1-3) In the step S407, it is judged whether or not the first and second printing drum selection key 18d is pushed (S407).

[0056] When the key 18d is pushed, the entire error display lamp section 18a consisting of plural lamps currently lighting up is switched off (S408). The first printing drum error detection and display process (S409, described later) and the second printing drum error detection and display process (S410, described later) are executed in order. Following these processes, the operation flow goes forward to the process of Step S303.

[0057] On the contrary, when the key 18d is not pushed, the operation flow immediately goes to Step S303 (see FIG. 4 and FIG. 5).

[0058] Next, a description will be given of the explanation of the printing drum error detection and display process with reference to FIG. 6. Although FIG. 6 shows the printing drum error detection and

display process only for the first printing drum 1, this process can be applied to the second printing drum 2.

[0059] The error detection and display process is broadly divided into two error detection processes, the error detection for the printing drums and the error detection for the discharged stencil sheet boxes.

[0060] Firstly, the error detection for the printing drums is performed. That is, it is judged whether or not the printing drum 1 is mounted on the machine 10 (S501). When the printing drum 1 is not mounted as a result of the judgment, it is so controlled that the first printing drum absence lamp 21 in the error display lamp section 18a lights up (S502) and the operation flow goes forward to Step S507.

[0061] On the other hand, when a result of the judgment indicates that the first printing drum 1 is mounted correctly, it is further judged that the first ink container in the first printing drum 1 is mounted (S503).

[0062] When no first ink container is mounted, it is so controlled that the first ink container absence lamp 23 in the error display lamp section 18a lights up (S504) and the operation flow then goes

forward to Step S507.

[0063] On the contrary, when the first ink container is mounted, it is judged the presence of an ink in it (S505). When there is no ink in the first ink container in the first printing drum 1 (namely, whether or not the first ink container is empty), it is so controlled that the first ink absence lamp 25 lights up in the error display lamp section 18a and the operation flow immediately goes to S507. When there is the ink in it (namely, not empty), the operation flow immediately goes forward to S507.

[0064] Next, a description will be given of the explanation of the error detection process for the discharged stencil sheet box and following processes (Step S507 to S510).

[0065] First, it is judged whether or not the first discharged stencil sheet box for the first printing drum 1 is mounted (S507). When the box is not mounted, it is so controlled that the first discharged stencil sheet box lamp 27 in the error display lamp section 18a lights up (S508). The series of the error detection processes is thereby completed.

[0066] On the other hand, when the first discharged stencil sheet box is mounted, it is judged whether or not it is filled with

discharged stencil sheets (S509). When it is filled, it is so controlled that the first discharged stencil sheet box full lamp 29 lights up (S510) and the series of the error detection processes is thereby completed.

[0067] Thus, the error detection and display process judges whether or not one or more errors relating to the printing drum itself and the discharged stencil sheet box occur. If at least one error occurs, the process controls that one or more the corresponding error lamps 21 to 30 in the error display lamp section 18a on the operation panel 18 light up.

[0068] Next, a description will be given of the explanation of the processes S303 to S308 shown in FIG. 4.

[0069] (2) It is judged whether or not the start key 18e to indicate the initiation of the stencil printing process is pushed (S303). When it is not pushed as a result of this judgment, the operation flow returns to the drum switching process (Step 301).

[0070] (3) When the result of this judgment indicates that the start key 18e is pushed, it is judged whether or not a mono-color printing process only for the first printing drum 1 is selected (S304).

[0071] When only the first printing drum 1 is selected, the stencil making and printing process only for the first printing drum 1 will be executed (S306).

[0072] (4) When only the first printing drum 1 is not selected, it is judged whether or not a mono-color printing process only for the second printing drum 2 is selected (S305).

[0073] When the result of this judgment indicates that only the second printing drum 2 is selected, the stencil making and printing process only for the second printing drum 2 will be executed (S308).

[0074] Here, a description will be given of the explanation of the stencil making and printing process only using the first printing drum 1 (or second printing drum 2) with reference to FIG. 7.

[0075] Although FIG. 7 shows the stencil making and printing process only for the first printing drum 1, this process can be applied to the second printing drum 2.

[0076] When the stencil making and printing process only using the first printing drum 1 is executed, at first, it is judged whether

or not one or more errors relating to the first printing drum 1 occur. When a result of this judgment indicates that one or more errors occur, the machine 10 displays the information relating to the occurrence of the errors relating to the first printing drum 1 in order to inform to the user the difficulty to execute the stencil making and printing process.

[0077] On the contrary, when no error for the first printing drum 1 occurs, the stencil making process for the first printing drum 1 is executed normally (S602).

[0078] After the completion of the stencil making process, it is judged again whether or not one or more errors relating to the first printing drum 1 occur (S603). When a result of this judgment indicates that one or more errors occur, the machine 10 displays the information relating to the occurrence of the errors relating to the first printing drum 1 in order to inform to the user the difficulty to execute the following processes.

[0079] On the other hand, when the result of this judgment indicates that no error occurs and the user does not push the stop key 18f to halt the operation of the printing process, the printing process using printing information made on the first printing drum 1 is executed (S605).

[0080] The judgment to detect whether or not one or more errors relating to the first printing drum 1 occur (or one or more errors relating to second printing drum 2), as shown in FIG. 9, will be performed for the following checks in order:

[0081] Is the first printing drum 1 mounted?;

[0082] Is the first ink container for the first printing drum mounted?;

[0083] Is there ink in the first ink container for the first printing drum 1?;

[0084] Is the first discharged stencil sheet box for the first printing drum 1 mounted?; and

[0085] Is the first discharged stencil sheet box filled?

[0086] When at least one error occurs, it is judged that one or more errors relating to the first printing drum 1 occur.

[0087] (5) When only the second printing drum 2 is not selected, it is judged to perform the stencil making and printing process using

both the first and second printing drums 1 and 2. Thereby, the machine 10 performs this process.

[0088] Here, a description will be given of the explanation of the stencil making and printing process (S307) using both the first and second printing drums 1 and 2 with reference to FIG. 8.

[0089] At first, when the stencil making and printing process using both the first and second printing drums 1 and 2 is performed, it is judged whether or not one or more errors relating to the first printing drum 1 occur (S701). When a detection result indicates that the error relating to the first printing drum 1 occurs, the machine 10 informs [to] the user the occurrence of the error relating to the first printing drum 1 and also informs the difficulty to execute the multi-color printing process.

[0090] On the other hand, the detection result indicates that there is no error relating to the first printing drum 1, the stencil making process for the first printing drum 1 is executed (S702).

[0091] After the completion of the stencil making process for the first printing drum 1, it is judged whether or not one or more errors relating to the second printing drum 2 occur. When a detection result indicates that the error relating to the second

printing drum 2 occurs, similar to the case of the first printing drum 1 prescribed, the machine 10 informs [to] the user the occurrence of the error relating to the second printing drum 2 and also informs the difficulty to execute the multi-color printing process.

[0092] On the other hand, there is no error relating to the second printing drum 2, the stencil making process for the second printing drum 2 is executed (S704). After the completion of the stencil making process, it is judged whether or not one or more errors relating to both the first printing drum 1 and the second printing drum 2 occur in order (S705 and S706).

[0093] As a result of this judgment, when the error occurs, the machine 10 informs [to] the user the occurrence of the error and also informs the difficulty to perform the printing process.

[0094] On the other hand, there is no error relating both the first and second printing drums 1 and 2, and when the user does not push the stop key 18f, the printing processes for the first and second printing drums 1 and 2 are performed in order (S708, S709).

[0095] Thus, according to the stencil printing machine and the control method of the embodiments of the present invention, even if

one or more errors occur in one printing drum, it is so controlled that the stencil making and printing process is performed by using other printing drum. Therefore the user who wants to perform the mono-color printing process can handle easily the stencil printing machine.

[0096] As set forth in detail, according to the stencil printing machine and the control method of the present invention, even if one or more errors occur in a printing drum that is not used in the stencil printing process, it is so controlled that the stencil printing process can be performed by using other printing drum. Therefore the user, specifically, who wants to perform the mono-color printing process, can easily handle the stencil printing machine.

[0097] Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

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BOX PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Inventor: Yoshikazu HARA

Serial No. 09/920,651

Examiner: CULLER, Jill E.

Filed: August 3, 2001

Art Unit: 2854

Title: **STENCIL PRINTING MACHINE AND CONTROL METHOD THEREOF**

Appendix D

✓ Please amend the specification as outlined in the following
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TITLE OF THE INVENTION

STENCIL PRINTING MACHINE AND CONTROL METHOD THEREOF

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims benefit of priority under 35 USC §119 to Japanese Patent Application No. P2000-238948, filed on Aug. 7, 2000, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a stencil printing machine and a control method thereof having a plurality of printing drums capable of performing multi-color printing.

[0004] 2. Description of the Related Art

[0005] In general, a stencil printing machine having plural printing drums capable of performing mono-color and multi-color printing comprises a first printing drum 111a, a second printing drum 111b, and a pressure drum 112 which are arranged rotatably, as shown in FIG. 1. Each of the first and second printing drums 111a and 111b are placed closely at the outer peripheral surface of the pressure drum 112 separated to each other in approximately a 90 degree angle around the center of the pressure drum 112.

[0006] In the initiation of the stencil printing process, firstly, stencil sheet clamp sections of both the first and second printing drums 111a and 111b clamp corresponding stencil sheets having perforations made based on the first and second color printing data so that they are rolled on the outer peripheral surface of the corresponding printing drums. Following this process, a print paper

is fed between the first printing drum 111a and the pressure drum 112 from the paper feed section 113 while the first and second printing drums 111a and 111b rotate around the arrow A in synchronization of the rotation of the pressure drum 112 around the arrow B.

[0007] Thereby, a print paper clamp section in the pressure drum 112 clamps the print paper which is fed and whereby the paper is further fed between the first printing drum 111a and the pressure drum 112 through the outer peripheral surface of the pressure drum 112. At this time, a first color ink is transferred onto the print paper through perforations made in the stencil sheet.

[0008] Next, the print paper from the first printing drum 111a is fed between the second printing drum 111b and the pressure drum 112. Similar to the first color printing process described above, the second color ink is transferred to the print paper through perforations made in the stencil sheet rolled on the second printing drum 111b. A paper delivery section 114 then delivers to a predetermined position the print paper on which a desired printing image data has been printed. Finally, the stencil sheets rolled on the outer peripheral surface of the printing drums 111a and 111b are disposed into discharged stencil sheet boxes 115a and 115b. Thereby, a series of the stencil printing process is

completed.

[0009] By the way, the stencil printing machine of the configuration described above has a drawback in which the entire printing process, specifically, a mono-color printing process can not be performed when one of printing drums is not mounted in the machine, or no ink cartridge is mounted, or the ink cartridge is empty, or no discharged stencil sheet box is mounted, or the discharged stencil sheet box is filled in one of the printing drums. In those cases, it is hard for the user to handle the stencil printing machine having the above configuration, specifically, in order to perform a mono-color printing.

SUMMARY OF THE INVENTION

[0010] Accordingly, an object of the present invention is, with due consideration to the drawbacks of the conventional technique, to provide a stencil printing machine and a control method thereof capable of improving the user-handling of the stencil printing machine and the stencil printing process.

[0011] In accordance with an embodiment of the present invention, a stencil printing machine comprises a plurality of printing drums and a control section controlling a stencil printing process so

that even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums. By this configuration of the stencil printing machine, it is possible to perform the stencil printing process using the printing drum which the user selects in the process without causing any trouble even if one printing drum which is not used in the process is in the error state.

[0012] Furthermore, in accordance with another embodiment of the present invention, a control method of a stencil printing machine having a plurality of printing drums comprises a control step of controlling a stencil printing process. In the control step, even if the printing drum that is not used in the current stencil printing process is in an error state, the stencil printing process is performed by using other printing drums. By this control method, it is possible to perform the stencil printing process using the printing drum which the user selects in the process without causing any trouble even if one printing drum which is not used in the process is in the error state.

[0013] Moreover, in accordance with another embodiment of the present invention, a control method of a stencil printing machine having a plurality of printing drums capable of performing mono-

color and multi-color printing processes comprises a control step in which a stencil printing process is so controlled that even if the printing drum which is not used is in an error state, the mono-color printing process is performed by using other printing drums. By this control method, even if the printing drum that is not used is in the error state, it is possible to perform the mono-color printing process by using other printing drums.

[0014] The stencil printing machine described above comprises a printing drum absence detection section comprising detectors provided to a corresponding printing drum detecting whether or not each of the printing drums is mounted in the stencil printing machine, a discharged stencil sheet box absence detection section comprising detectors provided to a corresponding printing drum detecting whether or not the discharged stencil sheet box is mounted in the corresponding printing drum, and a discharged stencil sheet box full detection section comprising detectors provided to a corresponding discharged stencil sheet box detecting whether or not the discharged stencil sheet box is filled with used stencil sheets. In addition, each printing drum further comprises an ink container detection section detecting whether or not the ink container is mounted in the corresponding printing drum, and an ink sensor section detecting whether or not an ink is filled in the corresponding ink container in the printing drum. In the stencil

printing machine, the control section controls the stencil printing process based on detection results of the above detection sections.

[0015] Furthermore, the stencil printing machine described above further comprises an operation panel displaying error information and through which a user selects one or more of the printing drums to be used in the stencil printing process and instructs to initiate the stencil printing process. In the stencil printing machine, the operation panel comprises at least one of the display sections to inform the following error states for each printing drum to the user: no printing drum is mounted; no ink container is mounted; ink container is empty; no discharged stencil sheet box is mounted; and a discharged stencil sheet box is filled with discharged stencil sheets.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] These and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings, in which:

[0017] FIG. 1 is a schematic diagram showing a basic configuration of a stencil printing machine;

[0018] FIG. 2 is a block diagram showing a configuration of a stencil printing machine according to embodiments of the present invention;

[0019] FIG. 3 is a block diagram showing a configuration of an operation panel in the stencil printing machine shown in FIG. 2;

[0020] FIG. 4 is a flow chart of a stencil printing process according to an embodiment of the present invention;

[0021] FIG. 5 is a flow chart showing a printing drum switching process in the stencil printing process according to an embodiment of the present invention;

[0022] FIG. 6 is a flow chart showing a printing drum error detection process in the stencil printing process according to an embodiment of the present invention;

[0023] FIG. 7 is a flow chart showing a stencil making and printing process in the stencil printing process according to an embodiment of the present invention;

[0024] FIG. 8 is a flow chart showing another stencil making and

printing process in the stencil printing process according to an embodiment of the present invention; and

[0025] FIG. 9 is a flow chart showing an error judgment process in the stencil printing process according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Other features of this invention will become apparent through the following description of preferred embodiments which are given for illustration of the invention and are not intended to be limiting thereof.

[0027] First Embodiment

[0028] Hereinafter, a description will be given for the detailed explanation of the configuration of the stencil printing machine and the control method thereof according to embodiments of the present invention with reference to FIG. 2 to FIG. 9.

[0029] <Configuration of Stencil Printing Machine>

[0030] Firstly, features of the configuration of the stencil

printing machine 10 according to embodiments of the present invention will be explained with reference to FIG. 2.

[0031] The configuration of main basic components in the stencil printing machine 10 of the present invention shown in FIG. 2 is basically equal to that of the stencil printing machine shown in FIG. 1. That is, the first printing drum 1, the second printing drum 2, and the pressure drum 17 shown in FIG. 1 correspond to the first printing drum 1 (as a first drum), the second printing drum 2 (as a second drum), and the pressure drum 17 shown in FIG. 2, respectively. In addition, discharged stencil sheet boxes 31 and 32, a paper feed section 33, a paper delivery section 34 shown in FIG. 1 are omitted from FIG. 2.

[0032] The stencil printing machine 10 according to the embodiments of the present invention shown in FIG. 2 comprises the first printing drums 1, the second printing drum 2, a CPU (central processing unit as a control section) 11, printing drum absence detectors 12a and 12b, discharged stencil sheet box absence detectors 14a and 14b for the discharged stencil sheet boxes 31 and 32, discharged stencil sheet box full detectors 15a and 15b for the discharged stencil sheet boxes 31 and 32, a main motor 16, the pressure drum 17, the operation panel 18, a ROM 19 for storing control programs for the operation of the CPU 11, and a RAM 20 for

storing data such as operation variables. In particular, the CPU 11 controls the operation of each configuration components in the machine 10 according to the control programs stored in the ROM 19. The printing drum absence detectors 12a and 12b for the printing drums 1 and 2 detect whether or not each printing drum is mounted on the machine 10. The discharged stencil sheet box absence detectors 14a and 14b detect whether or not a discharge stencil sheet box is mounted on each corresponding printing drum. The discharged stencil sheet box full detectors 15a and 15b detect whether or not each discharged stencil sheet box is filled. The main motor 16 drives the printing drums 1 and 2 and the pressure drum 17. Through the operation panel 18, the user instructs the initiation of the operation of the printing drums 1 and 2 and the pressure drum 17 that will be used in the stencil making and printing process. The ROM 19 stores the control programs for the operation of the CPU 11.

[0033] Each printing drum comprises an ink container detector 13a (13a'), an ink sensor 13b (13b'), and an ink motor 13c (13c'). The ink container detector 13a (13a') detects whether or not the ink container is mounted on each corresponding printing drum. The ink sensor 13b (13b') detects the presence of the ink on a squeegee roller of each printing drum (namely, the ink sensor detects whether or not the ink container is empty). The ink motor 13c

(13c') supplies the ink to the squeegee roller the from the ink container.

[0034] As shown in FIG. 13, the operation panel 18 comprises an error display lamp section 18a, a first printing drum selection key 18b, a second printing drum selection key 18c, a first and second printing drums selection key 18d, a start key 18e, and a stop key 18f.

[0035] The error display lamp section 18a displays various states (specifically, error states) relating to each of the first and second printing drums 1 and 2. The user may select stencil making and printing process for the first printing drum 1 through the first printing drum selection key 18b in the operation panel 18. The user may also select the stencil making and printing process for the second printing drum 2 through the second printing drum selection key 18c. The user may also select the stencil making and printing process for the first and second printing drums 1 and 2 through the first and second printing drums selection key 18d. The user may instruct to start the stencil making and printing process through the start key 18e and to stop the stencil making and printing process through the stop key 18f.

[0036] The error display lamp section 18a comprises a plurality of

error display lamps in order to inform the following error states to the user:

[0037] No first printing drum 1 is mounted (first printing drum absence lamp 21);

[0038] No second printing drum 2 is mounted (second printing drum absence lamp 22);

[0039] No first ink container is mounted (first ink container absence lamp 23);

[0040] No second ink container is mounted (second ink container absence lamp 24);

[0041] The first color ink in the first ink container is empty (first ink empty lamp 25);

[0042] The second color ink in the second ink container is empty (second ink empty lamp 26);

[0043] No first discharged stencil sheet box for the first printing drum 1 is mounted (first discharged stencil sheet box absence lamp 27);

[0044] No second discharged stencil sheet box for the second printing drum 2 is mounted (second discharged stencil sheet box absence lamp 28);

[0045] The first discharged stencil sheet box for the first printing drum 1 is filled (first discharged stencil sheet box full lamp 29); and

[0046] The second discharged stencil sheet box for the second printing drum 2 is filled (second discharged stencil sheet box full lamp 30).

[0047] <Control Method of Stencil Printing Machine>

[0048] Next, a description will be given of the control method for the stencil printing machine 10 according to the embodiments of the present invention with reference to FIG. 4 to FIG. 9.

[0049] The stencil printing process of the stencil printing machine 10 is controlled based on following steps S301 to S308 shown in FIG. 4.

[0050] (1) When the user selects one or more the printing drums 1

and 2 (Step S301) through the first, the second, and the first and second printing drum selection keys 18b, 18c, and 18d on the operation panel 18, the CPU 11 executes the following sub-steps S401 to S410 shown in FIG. 5.

[0051] (1-1) It is judged whether or not the first printing drum selection key 18b is pushed (S401). When the key 18b is pushed, the entire error display lamp section 18a consisting of the plural lamps currently lighting up is switched off (S402). After the following first printing drum error detection and display process is executed (S403, described later), the operation flow goes forward to Step S303. On the other hand, when the key 18b is not pushed, the operation flow immediately goes to the process Step S404 (see FIG. 4 and FIG. 5).

[0052] (1-2) In the step S404, it is judged whether or not the second printing drum selection key 18c is pushed (S404).

[0053] When the key 18c is pushed, the entire error display lamp section 18a consisting of plural lamps currently lighting up is switched off (S405). After the following second printing drum error detection and display process is executed (S406, described later), the operation flow goes forward to the process of Step S303.

[0054] On the contrary, when the key 18c is not pushed, the operation flow immediately goes to the process of S407 (see FIG. 4 and FIG. 5).

[0055] (1-3) In the step S407, it is judged whether or not the first and second printing drum selection key 18d is pushed (S407).

[0056] When the key 18d is pushed, the entire error display lamp section 18a consisting of plural lamps currently lighting up is switched off (S408). The first printing drum error detection and display process (S409, described later) and the second printing drum error detection and display process (S410, described later) are executed in order. Following these processes, the operation flow goes forward to the process of Step S303.

[0057] On the contrary, when the key 18d is not pushed, the operation flow immediately goes to Step S303 (see FIG. 4 and FIG. 5).

[0058] Next, a description will be given of the explanation of the printing drum error detection and display process with reference to FIG. 6. Although FIG. 6 shows the printing drum error detection and display process only for the first printing drum 1, this process can be applied to the second printing drum 2.

[0059] The error detection and display process is broadly divided into two error detection processes, the error detection for the printing drums and the error detection for the discharged stencil sheet boxes.

[0060] Firstly, the error detection for the printing drums is performed. That is, it is judged whether or not the printing drum 1 is mounted on the machine 10 (S501). When the printing drum 1 is not mounted as a result of the judgment, it is so controlled that the first printing drum absence lamp 21 in the error display lamp section 18a lights up (S502) and the operation flow goes forward to Step S507.

[0061] On the other hand, when a result of the judgment indicates that the first printing drum 1 is mounted correctly, it is further judged that the first ink container in the first printing drum 1 is mounted (S503).

[0062] When no first ink container is mounted, it is so controlled that the first ink container absence lamp 23 in the error display lamp section 18a lights up (S504) and the operation flow then goes forward to Step S507.

[0063] On the contrary, when the first ink container is mounted, it is judged the presence of an ink in it (S505). When there is no ink in the first ink container in the first printing drum 1 (namely, whether or not the first ink container is empty), it is so controlled that the first ink absence lamp 25 lights up in the error display lamp section 18a and the operation flow immediately goes to S507. When there is the ink in it (namely, not empty), the operation flow immediately goes forward to S507.

[0064] Next, a description will be given of the explanation of the error detection process for the discharged stencil sheet box and following processes (Step S507 to S510).

[0065] First, it is judged whether or not the first discharged stencil sheet box for the first printing drum 1 is mounted (S507). When the box is not mounted, it is so controlled that the first discharged stencil sheet box lamp 27 in the error display lamp section 18a lights up (S508). The series of the error detection processes is thereby completed.

[0066] On the other hand, when the first discharged stencil sheet box is mounted, it is judged whether or not it is filled with discharged stencil sheets (S509). When it is filled, it is so controlled that the first discharged stencil sheet box full lamp 29

lights up (S510) and the series of the error detection processes is thereby completed.

[0067] Thus, the error detection and display process judges whether or not one or more errors relating to the printing drum itself and the discharged stencil sheet box occur. If at least one error occurs, the process controls that one or more the corresponding error lamps 21 to 30 in the error display lamp section 18a on the operation panel 18 light up.

[0068] Next, a description will be given of the explanation of the processes S303 to S308 shown in FIG. 4.

[0069] (2) It is judged whether or not the start key 18e to indicate the initiation of the stencil printing process is pushed (S303). When it is not pushed as a result of this judgment, the operation flow returns to the drum switching process (Step 301).

[0070] (3) When the result of this judgment indicates that the start key 18e is pushed, it is judged whether or not a mono-color printing process only for the first printing drum 1 is selected (S304).

[0071] When only the first printing drum 1 is selected, the stencil

making and printing process only for the first printing drum 1 will be executed (S306).

[0072] (4) When only the first printing drum 1 is not selected, it is judged whether or not a mono-color printing process only for the second printing drum 2 is selected (S305).

[0073] When the result of this judgment indicates that only the second printing drum 2 is selected, the stencil making and printing process only for the second printing drum 2 will be executed (S308).

[0074] Here, a description will be given of the explanation of the stencil making and printing process only using the first printing drum 1 (or second printing drum 2) with reference to FIG. 7.

[0075] Although FIG. 7 shows the stencil making and printing process only for the first printing drum 1, this process can be applied to the second printing drum 2.

[0076] When the stencil making and printing process only using the first printing drum 1 is executed, at first, it is judged whether or not one or more errors relating to the first printing drum 1 occur. When a result of this judgment indicates that one or more

errors occur, the machine 10 displays the information relating to the occurrence of the errors relating to the first printing drum 1 in order to inform to the user the difficulty to execute the stencil making and printing process.

[0077] On the contrary, when no error for the first printing drum 1 occurs, the stencil making process for the first printing drum 1 is executed normally (S602).

[0078] After the completion of the stencil making process, it is judged again whether or not one or more errors relating to the first printing drum 1 occur (S603). When a result of this judgment indicates that one or more errors occur, the machine 10 displays the information relating to the occurrence of the errors relating to the first printing drum 1 in order to inform to the user the difficulty to execute the following processes.

[0079] On the other hand, when the result of this judgment indicates that no error occurs and the user does not push the stop key 18f to halt the operation of the printing process, the printing process using printing information made on the first printing drum 1 is executed (S605).

[0080] The judgment to detect whether or not one or more errors

relating to the first printing drum 1 occur (or one or more errors relating to second printing drum 2), as shown in FIG. 9, will be performed for the following checks in order:

[0081] Is the first printing drum 1 mounted?;

[0082] Is the first ink container for the first printing drum mounted?;

[0083] Is there ink in the first ink container for the first printing drum 1?;

[0084] Is the first discharged stencil sheet box for the first printing drum 1 mounted?; and

[0085] Is the first discharged stencil sheet box filled?

[0086] When at least one error occurs, it is judged that one or more errors relating to the first printing drum 1 occur.

[0087] (5) When only the second printing drum 2 is not selected, it is judged to perform the stencil making and printing process using both the first and second printing drums 1 and 2. Thereby, the machine 10 performs this process.

[0088] Here, a description will be given of the explanation of the stencil making and printing process (S307) using both the first and second printing drums 1 and 2 with reference to FIG. 8.

[0089] At first, when the stencil making and printing process using both the first and second printing drums 1 and 2 is performed, it is judged whether or not one or more errors relating to the first printing drum 1 occur (S701). When a detection result indicates that the error relating to the first printing drum 1 occurs, the machine 10 informs the user the occurrence of the error relating to the first printing drum 1 and also informs the difficulty to execute the multi-color printing process.

[0090] On the other hand, the detection result indicates that there is no error relating to the first printing drum 1, the stencil making process for the first printing drum 1 is executed (S702).

[0091] After the completion of the stencil making process for the first printing drum 1, it is judged whether or not one or more errors relating to the second printing drum 2 occur. When a detection result indicates that the error relating to the second printing drum 2 occurs, similar to the case of the first printing drum 1 prescribed, the machine 10 informs the user the occurrence

of the error relating to the second printing drum 2 and also informs the difficulty to execute the multi-color printing process.

[0092] On the other hand, there is no error relating to the second printing drum 2, the stencil making process for the second printing drum 2 is executed (S704). After the completion of the stencil making process, it is judged whether or not one or more errors relating to both the first printing drum 1 and the second printing drum 2 occur in order (S705 and S706).

[0093] As a result of this judgment, when the error occurs, the machine 10 informs the user the occurrence of the error and also informs the difficulty to perform the printing process.

[0094] On the other hand, there is no error relating both the first and second printing drums 1 and 2, and when the user does not push the stop key 18f, the printing processes for the first and second printing drums 1 and 2 are performed in order (S708, S709).

[0095] Thus, according to the stencil printing machine and the control method of the embodiments of the present invention, even if one or more errors occur in one printing drum, it is so controlled that the stencil making and printing process is performed by using other printing drum. Therefore the user who wants to perform the

mono-color printing process can handle easily the stencil printing machine.

[0096] As set forth in detail, according to the stencil printing machine and the control method of the present invention, even if one or more errors occur in a printing drum that is not used in the stencil printing process, it is so controlled that the stencil printing process can be performed by using other printing drum. Therefore the user, specifically, who wants to perform the mono-color printing process, can easily handle the stencil printing machine.

[0097] Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.